

## Assignment #3

### Objects, Instance/Static Methods, ArrayLists, Encapsulation

#### Requirements:

- Implement a class **Student**. For the purpose of this exercise, a student has an **ID**, **midterm score**, **preQuiz score**, **LabQuiz score**, **HW1 score**, **total score**, and **gpa**.
- You are not required to implement a tester class, though it is strongly advised that you do so. Your classes will be executed against the TA's tester class. It is essential that your classes correctly implement the public interfaces, or they'll break the tester's code! In that event, your maximum grade is 60.
- Supply an appropriate **constructor**.
- Supply appropriate methods `getID()`, `getTotalScore()`, `getAverageScore()`, `numberOfScore()`, `standerDev()`, `gradeDistribution()`, `gpa()`, etc.
- The grade point averages (gpa) calculation use the grading scale as follows:

98 <= A+	88 <= B+ < 90	78 <= C+ < 80	60 <= D < 70
92 <= A < 98	82 <= B < 88	72 <= C < 78	F < 60
90 <= A- < 92	80 <= B- < 82	70 <= C- < 72	

#### Public interface

- Create a **constructor** for the **Student** class, a student has an **ID**, **midterm score**, **preQuiz score**, **LabQuiz score**, **HW1 score**, **total score**, and **gpa**.
- Write a method  
`getID(void):String`  
that returns the student's ID.
- Write methods  
`getStuScore(void):double[]`  
that returns the quiz/HW/exam score of specified student.  
e.g.[57.0 20.0 0.0 25.0].
- Write a method  
`setStuTtlScore(void)`  
that returns the total score of specified student. The percentage of each test contributes to the total score is 40%(midterm), 20%(preQuiz), 20%(LabQuiz), and 20%(HW1).  
e.g.  $57*0.4 + 20*0.2 + 0*0.2 + 25*0.2 = 31.8$ .
- Write corresponding accessor method for the total score:  
`getStuTtlScore(void):double`
- Write a method  
`setStuAvgScore(void)`  
that returns the average score of specified student. You need to store the number of quiz/HW/exam that the student took and provide average score for that.  
e.g.  $(57+20+0+25) / 3 = 34.0$ .
- Write corresponding accessor method for the average score:  
`getStuAvgScore(void):double`
- Write a method  
`setStuGpa(void)`  
that assign corresponding gpa to specified student according to the total score.  
e.g. the gpa for the student with total score 31.8 is F.

- Write corresponding accessor method for the gpa:  
`getStuGpa(void):String`
- Write a **static** methods  
`allStuAvgScore(ArrayList):double[]`  
that returns the average score for each quiz/HW/exam of all students.  
e.g. [56.4 26.3 68.6 91.2].
- Write a **static** method  
`allStuStd(ArrayList):double[]`  
that returns the amount of variation of each quiz/HW/exam of all students.  
e.g. [19.1 19.4 24.9 39.6].

$$\sigma = \sqrt{\frac{1}{N} [(x_1 - \mu)^2 + (x_2 - \mu)^2 + \dots + (x_N - \mu)^2]}, \text{ where } \mu = \frac{1}{N}(x_1 + \dots + x_N)$$

- Write a **static** method  
`gradeDistribution(ArrayList):void`  
that prints out the grade distribution (i.e., number of grades in each letter grade category) of all students.

e.g.

```
A+ = 1
A  = 0
A- = 2
B+ = 0
B  = 0
B- = 0
C+ = 1
C  = 0
C- = 0
D  = 1
F  = 3
```

- (extra 2%)Write a **static** methods  
`scoreSorting(ArrayList, String):ArrayList`  
that returns the sorted list of specified subject (i.e. quiz/HW/exam), the rest part of data need to be rearranged according to the data selection. .

e.g.

Midterm	preQuiz	LabQuiz	HW1
57	20	0	25
44	0	60	0
66	35	60	0

Sorted by midterm:

Midterm	preQuiz	LabQuiz	HW1
66	35	60	0
57	20	0	25
44	0	60	0

- Generate complete Javadoc (e.g. import statement, class, method, comments, etc.) for the class.

**Submission:** Your Eclipse project is named `yourStudentID_HW3`. Put all files in a folder and compressed it. Submit your assignment on eCourse under `HW3`. No other submissions will be graded and points will be deducted for late submission.

**Academic dishonesty:** You may not do work for another student nor may any student copy or plagiarize someone else's work. Severe penalties will be imposed on all parties involved.

**Deadline:** Thursday, May 10, 2018. (end of the day)